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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

23 JUL 2004

Applicant's or agent's file reference 91.M1002WO36	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IT 02/00690	International filing date *(day/month/year)* 29.10.2002	Priority date *(day/month/year)* 24.01.2002
International Patent Classification (IPC) or both national classification and IPC A23L3/18		
Applicant SIG MANZINI S.P.A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand 23.06.2003	Date of completion of this report 19.07.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Merkl, B Telephone No. +49 89 2399-2138

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/AT 02/00690

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1, 2, 4	as originally filed
3, 5, 6	received on 05.07.2004 with letter of 02.07.2004

Claims, Numbers

1-3	received on 05.07.2004 with letter of 02.07.2004

Drawings, Sheets

1/3-3/3	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-3
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-3
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-3
	No:	Claims	

2. Citations and explanations

see separate sheet

Item V:

1. D1: EP-A-0 780 056 (NESTLE SA) 25 June 1997 (1997-06-25)
   D2: GB-A-1 550 434 (KRAFTCO CORP) 15 August 1979 (1979-08-15)
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   D4: GB 264 278 A (HARRY CHARLES DAVIS;MOLASSINE COMPANY LTD) 20 January 1927 (1927-01-20)
   D5: EP-A-0 403 137 (GEN FOODS INC) 19 December 1990 (1990-12-19)
   D6: US-A-5 906 853 (SMITH GARY F) 25 May 1999 (1999-05-25)

2. A method for sterilizing food products by injection of steam and mixing the heated product by means of a dynamic mixer is known from D1 (page 2, last line - page 3, line 2; drawings), D3 (page 1, lines 17-23), D4 (page 1, lines 13-88; drawings) and D6 (col. 4, line 51 - col. 5, line 26; drawings). The dynamic mixer in D1 consists of a rotating shaft (14) comprising disks (15) comprising holes (26). In D1 the heating and mixing step are simultanous (Fig. 1, right hand part of the drawing, steam inlets (13) and dynamic mixing device (15)). Due to the rotation of the shaft mixing and homogenisation of the product to which steam has been injected will be achieved. In D3 an apparatus is disclosed as prior art wherein a steam treated product is treated by a powered mixing device, eg a screw. The heating and mixing takes place simultanously (Fig. 3). In D4 the dynamic mixer consists of a power-driven shaft (g) provided with paddles (j) to cause the steam treated ingredients to be intimately mixed. In D4 the heating and mixing step are simultaneous and the steam injection takes place by a plurality of nozzles (l) directly associated with the dynamic mixture (Figure). In D6 the dynamic mixer consists of a power driven (22) rotor comprising a shaft (20) comprising parallel, axially extending rods (24) attached thereto to agitate the steam treated (14) product.

   However, the amended claims meet the requirements of novelty as in none of the documents cited in the search report a method for sterilizing food products is disclosed comprising the subsequent steps of heating the product by injection of steam to insure asepsis of the product, mixing the product through at least one static mixer and then mixing the product through a dynamic mixer. Therefore the requirements of novelty (Art. 33(2) PCT are regarded to be met.

3. The problem of the present application was to provide a method for sterilizing food products which allows uniformly to heat the products without deterioriation of its

properties and which is simple and economical to implement. D1 is regarded to represent the closest prior art. D1 differs from the presently claimed subject-matter in that there is no additional static mixer and in that steam injection and dynamic mixing take place simultaneously. Although the further addition of a static mixer could be regarded as an option the skilled person there was no hint in the prior art to separate the steam injection step from the dynamic mixing step by means af a staic mixer. Therefore the requirements of inventive step (Art. 33(3) PCT) are regarded to be met with respect to claims 1-3.

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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CORRECTED VERSION

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

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   However, the amended claims meet the requirements of novelty as in none of the documents cited in the search report a method for sterilizing food products is disclosed comprising the subsequent steps of heating the product by injection of steam to insure asepsis of the product, mixing the product through at least one static mixer and then mixing the product through a dynamic mixer. Therefore the requirements of novelty (Art. 33(2) PCT are regarded to be met.

3. The problem of the present application was to provide a method for sterilizing food products which allows uniformly to heat the products without deterioriation of its

properties and which is simple and economical to implement. D1 is regarded to represent the closest prior art. D1 differs from the presently claimed subject-matter in that there is no additional static mixer and in that steam injection and dynamic mixing take place simultaneously. Although the further addition of a static mixer could be regarded as an option the skilled person there was no hint in the prior art to separate the steam injection step from the dynamic mixing step by means af a staic mixer. Therefore the requirements of inventive step (Art. 33(3) PCT) are regarded to be met with respect to claims 1-3.

An additional drawback, therefore, is represented by the impossibility of throttling the plant, without compromising the asepsis of the product at the end of the treatment.

DISCLOSURE OF INVENTION.

An aim of the present invention is to eliminate the aforesaid drawbacks making available a method for sterilising food products, in particular purees and/or concentrates, which allows uniformly to heat the product to be treated, without any deterioration of its quality.

An additional aim of the present invention is to propose a sterilising method that allows to throttle the plant, without compromising the asepsis of the final product.

Another aim of the present invention is make available a method that allows a chemical-physical homogenisation of the product, drastically reducing its degradation.

A further aim of the present invention is to propose a sterilisation method that is simple and economical to implement.

Said aims are fully achieved by the method for sterilising food products, in particular purees and/or concentrates, of the present invention, which is characterised by the content of the claims set out below. ~~and in particular in that the method provides for executing the mixing step by means of at least a dynamic mixer.~~

BRIEF DESCRIPTION OF DRAWINGS.

This and other characteristics shall become more readily apparent from the following description of a preferred embodiment of the method illustrated, purely by way of non limiting example, in the accompanying drawing tables,

a static mixer.

Figure 3 shows, purely by way of example, a possible embodiment of a static mixer able to carry out the aforesaid mixing step in accordance with the method.

With reference to Figure 3, the static mixer is globally indicated with the number 5 and comprises a tubular body 6 inside which flows the product, typically food puree or concentrate, a plurality of fixed baffles 7, positioned inside the tubular body and so shaped as to operate continuous deviations of the product and separation of the threads, to allow its mixing by effect of the turbulence that develops.

Figure 1 shows a possible embodiment of the method according to the invention.

The product flows inside a conduit 100, which has undulated inner walls in accordance with the prior art and is provided with a plurality of steam injectors 200.

Subsequently, the heated product flows inside one or more static mixers 105, which perform a first coarse mixing to uniform the temperature of the product.

Thereafter, the pre-mixed product reaches a dynamic mixer 101 which performs a fine mixing, uniforming the temperature of the product and assuring its sterilisation.

~~According to an embodiment variation, the heating and mixing steps can be~~ simultaneous. In this case, the steam injection ~~takes~~ place by means of a plurality of nozzles ~~preferably~~ associated directly to the dynamic mixer, ~~thereby obtaining a single processing stage.~~

The method of the invention achieves important advantages.

First of all, such a method allows to heat the product in uniform fashion, assuring temperature stability and guaranteeing asepsis. In particular, the use of a dynamic mixer allows a chemical-physical homogenisation of the product, drastically reducing its degradation and safeguarding the organoleptic characteristics such as taste and colour, or the physical characteristics, such as viscosity and consistency.

Secondly, a mixing step carried out by means of dynamic mixers allows to throttle the plant, without compromising a uniform temperature distribution inside the product and thus guaranteeing the asepsis of the final product.

Advantageously, said method is simple and economical to implement and can be used to sterilise even products with high viscosity.

Another advantage is represented by the fact that, given the presence of dynamic mixers, the static mixers and the undulated conduits into which the steam is injected can have reduced length, since the turbulence created by them in the product is not the sole source of mixing action. Thanks to conduits of reduced length, therefore, it is possible to reduce head losses inside the plant, achieving considerable energy savings and lower pressures of the injected steam. ~~This is even more readily apparent if the heating step is simultaneous with the mixing step and both take place inside a dynamic mixer, in accordance with the described embodiment variation.~~

CLAIMS

1. Method for sterilising food products, in particular purees and/or concentrates, comprising the **distinct and subsequent** steps of:

- heating the product by injection of steam at predetermined temperature **to ensure the asepsis of the product;**

- mixing the product **through at least a static mixer (105)** to allow a substantially uniform distribution of the steam;

~~characterised in that the mixing step takes place by means of at least a dynamic mixer.~~

- mixing the product in a dynamic mixer (101) which performs a fine mixing, the static and dynamic mixing performing an equal heating of the product uniforming the temperature of the product and ensuring its sterilisation.

2. Method as claimed in claim 1, characterised in that the dynamic mixer comprises:

at least a tank for collecting the product;

at least an agitator associated with the tank and operatively active on the ~~product to mix it;~~

means for actuating the agitator.

~~3. Method as claimed in claim 1, characterised in that it further comprises a step of mixing the product by means of at least a static mixer.~~

3. ~~4.~~ Method as claimed in claim ~~3~~ 1, characterised in that the static mixer comprises:

at least a tubular body within which the product flows;

a plurality of fixed baffles, positioned inside the tubular body and so shaped

as to operate continuous deviations of the product, to allow its mixing.

~~5. Method as claimed in claim 1, characterised in that the heating and~~ mixing steps are simultaneous.

6. Method as claimed in claim 5, characterised in that the steam injection takes place by means of a plurality of nozzles directly associated with the ~~dynamic mixer.~~